Operational Summary for Vegetation Management

Ericaceous Shrub Complex

Ericaceous Shrub Complex

This operational summary provides information about vegetation management in the ericaceous shrub complex. The complex is dominated by the following shrubs: false azalea (*Menziesia ferruginea*), white-flowered rhododendron (*Rhododendron albiflorum*), oval-leaved blueberry (*Vaccinium ovalifolium*), and black huckleberry (*Vaccinium parvifolium*). The dominant herb is Sitka valerian (*Valeriana sitchensis*) on fresh to moist sites. Other herbs that may invade following harvest include: fireweed, woodrush, red elderberry, mountain ash, foamflower, mountain arnica, twisted stalk, and Indian hellebore.

Topics covered in this summary include development of the complex and its interaction with crop trees; non-timber values and pre-harvest considerations; and management strategies for current and backlog sites.

Other Titles in this Series

Operational Summary for Vegetation Management:

- Dry Alder Complex
- Fireweed Complex
- Mixed-shrub Complex
- Pinegrass Complex
- Wet Alder Complex
- Willow Complex

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Operational Summary for Vegetation Management

Ericaceous Shrub Complex

Foreword

Managing competing vegetation during reforestation can be challenging. Combinations of plants that thrive in seral ecosystems are often well suited to dominating sites following harvesting or wildfire. While many treatment methods for limiting the growth and spread of these vegetation complexes have been explored, efficacy has varied widely. This is due in part to the widely varying mix of parameters from site to site, including the number, health and structure of the competing plants on site, site conditions and timing of forestry activities. In addition, while some treatments may provide suitable control, the cost in terms of site degradation, hazard to surrounding habitat or crop trees, or the cost of the treatment itself may be prohibitive.

Much work has been undertaken during the past decade by ecologists, silviculturists, and vegetation management specialists on identifying the characteristics of and the range of treatment options for major competing vegetation complexes. Until recently, however, knowledge about managing particularly challenging vegetation complexes was scattered. This series summarizes the key information needed to identify and manage important vegetation complexes in British Columbia.

Introduction

This operational summary provides information about vegetation management issues in the ericaceous shrub complex. Topics include: complex development and interaction with crop trees; treatments that affect development of the complex; non-timber and pre-harvest considerations; and management strategies for current and backlog sites. Each complex includes several plant species and may be found over a wide range of ecosystems. As a result, response to treatments will vary within complexes, prescriptions should be developed on a site-specific basis.

1. Description

Species Composition

The following shrubs predominate in this complex:

- false azalea (*Menziesia ferruginea*)
- white-flowered rhododendron (*Rhododendron albiflorum*)
- oval-leaved blueberry (*Vaccinium ovalifolium*)
- black huckleberry (*Vaccinium parvifolium*)
- Indian hellebore (*Veratrum viride*).

Sitka valerian (*Valeriana sitchensis*) is the dominant herb on fresh to moist ESSF sites. Major herbaceous species invading these sites after harvesting disturbance include:

- fireweed (*Epilobium angustifolium*)
- woodrush (*Luzula* spp.)
- red elderberry (*Sambucus racemosa*)
- mountain ash (*Sorbus sitchensis*)
- foamflower (*Tiarella* spp.)
- mountain arnica (*Arnica latifolia*)
- twistedstalk (*Streptopus* spp.)
- Indian hellebore (*Veratrum viride*).

Occurrence

The ericaceous shrub complex, common on dry to moist ecosystems in the ESSF and ICH, is problematic on all cool, steep, north slopes in the ESSF and ICH.

This complex occurs on a variety of soil and site conditions in mature, open forests and open meadows. Soils are often shallow Humo-Ferric Podzols and Dystric Brunisols originating from colluvial or morainal parent materials. Humus forms range from Hemimors to Hemihumimors, with thicknesses from 2 to 20 cm (averaging 8 cm). Thick humus forms contribute to cool soil temperatures because of their insulating properties. Acidic soil conditions (i.e., pH 3.5–5.0) are also ideal for the development of ericaceous shrubs.

2. Development

Reproduction

In mature forests this complex is typically found in the openings of the forest stand. The shrubs reproduce vegetatively by sprouting from the root collar and lower stem or by layering. Regeneration from seed is rare. White rhododendron, oval-leaved blueberry, and black huckleberry are all rhizomatous and produce thickets or clones for a long period of time in the forest understory. Most of the herbaceous species are rhizomatous.

Rate of Development

After canopy removal, undisturbed shrubs increase slowly in height. Cut plants resprout slowly, growing 5 to 15 cm/year. Establishment of shrubs by seed is infrequent and growth is slow on undisturbed sites.

Sitka valerian increases rapidly in size following overstory removal. Sitka valerian can initiate vegetative growth in the spring when the snow is still 15–25 cm deep. This strategy gives it a competitive advantage over other herbaceous species and conifer seedlings. Communities dominated by Sitka valerian tend to reach a maximum height of 50–75 cm, whereas the fireweed-dominated communities tend to be 1.0–1.5 m tall.

While Sitka valerian is the most aggressive perennial herb in the complex, other herbaceous species also respond quickly when the overstory is removed. As well, fireweed can invade the lower to mid-elevations of the ESSF when these sites are severely disturbed or burnt.

Treatments that Affect Development

In this complex, future competition problems are aggravated by:

- leaving understory vegetation intact during harvest (for example, by logging while a deep snowpack remains)
- summer logging, medium- to high-impact broadcast burns, or by mechanical site preparation (MSP) that causes a herb-dominated community to replace the shrub or shrub/herb community
- low- and medium-impact burns that favour Sitka valerian and fireweed; oval-leaved blueberry and black huckleberry are less sensitive to burning than false azalea and white-flowered rhododendron.

Interactions with Crop Trees

A well-developed rhododendron or false azalea canopy can limit the growth of Engelmann spruce and lodgepole pine by reducing light levels and soil temperatures and by physically damaging small seedlings. However, because these two shrub species recover slowly after manual cutting or scarification, prompt planting of tree seedlings after site preparation can ensure that the seedlings outgrow the competition. The *Vaccinium* species are not considered strong competitors in the ericaceaous shrub complex.

On drought-prone sites, rhododendron may provide shade and reduce moisture losses in young seedlings.

3. Non-timber Values

This vegetation complex has low ungulate forage values, but provides a major habitat for some animals that use the ESSF either year-round or during the snow-free season. For example, the dense shrub thickets provide nesting and "hiding cover" for many small animals but may inhibit mobility of larger species. Rhododendron is unpalatable (even poisonous) to livestock and most wildlife, but apparently grouse can feed on it. False azalea is seldom browsed. However, the berries of the two *Vaccinium* species are prized by bears, humans, small mammals, and many bird species. As well, the *Vaccinium* foliage and twigs are also heavily used by wildlife, making the value of this complex greater where there is a high component of *Vaccinium* species.

Sheep, cattle, and various wildlife species browse on Sitka valerian and other typical subalpine herbs.

4. Pre-harvest Considerations

Silvicultural System

Overstory removal has relatively little impact on shrub competition but herbs such as Sitka valerian will greatly increase in vigour. Improved reforestation success and non-timber values may result from using group selection or similar silvicultural systems, particularly at higher elevations.

Advance Regeneration

If enough acceptable well-spaced advance regeneration is present on-site, winter logging should be considered to protect the advance regeneration.

Method of Reforestation

Planting will be necessary as natural regeneration is unsuccessful at higher to mid-elevations in the ESSF. However, partial cutting which creates a less harsh environment, may improve the success of natural regeneration of shade-tolerant species such as subalpine fir.

Timing

The site should be planted immediately after site preparation to take advantage of improved site conditions, including warmer soil temperatures. Although this vegetation complex takes longer to recover after site preparation than most other complexes, prompt site preparation and planting following harvesting will promote reforestation success.

5. Vegetation Management Strategies for Current Sites

Site Preparation

Mechanical

Mechanical site preparation (MSP) is considered the most effective site preparation method for vegetation control in the ESSF. Specific objectives for MSP in this complex include the displacement of the humus layers. This can result in increased soil temperatures, improved drainage and control of competing vegetation.

Mechanical site preparation can control the ericaceous shrub complex for at least 15 years. Herbs that are damaged may produce slow-growing suckers, and uprooted plants often do not recover for at least three growing seasons.

Where slash is heavy, a small caterpillar tractor with brush blade can be used to create narrow planting trails with exposed mineral soil. Patch scarifiers are appropriate, provided that the exposed patch is large enough. Mounders may provide the greatest benefit if the mound is 25–30 cm in height. Power disc trenchers may be equally effective. To date, mounding and disc trenching experience in the ESSF has been limited.

Screefing

This technique may successfully control ericaceous shrubs if the exposed patch is large. However, *Vaccinium* species and herbs may quickly encroach on the screef by rhizome invasion.

Prescribed Fire

On steep slopes where MSP is not an option, burning should be considered. Historically, medium- to high-impact burns followed by immediate planting have led to successful reforestation.

The wet subzones of the ESSF have a narrow window for prescribed burns. In these subzones, stands are more open, fuels are less flammable, and fuel load is discontinuous. Drier subzones with shallow humus layers are more susceptible to site degradation when burns are of medium to high intensities.

Low-impact burns in the wetter subzones of the ESSF contribute to rapid growth of rhizomatous herbs. Medium-impact burns will control the ericaceous shrub complex, but will often cause a shift from shrub- to herb-dominated communities. On wet areas, Sitka valerian generally dominates; on drier areas, fireweed prevails.

High-impact burns will control the ericaceous shrub community and reduce the vigour of the resultant herbaceous community but may result in site disturbance. High-impact burns, which are most effective for vegetation management, are best achieved in the summer. The combination of summer burning followed by immediate summer planting with two-year-old spruce is an effective treatment.

Chemical

Herbicides may be considered where MSP and prescribed burns are not appropriate for the site or where advanced regeneration is being preserved. Steep, north-facing slopes where machines cannot operate and the burning window is extremely short are often candidates for this treatment. To date herbicide use in the ESSF has been primarily experimental, and appears to provide relatively short-term control of vegetation and limited soil temperature gains. Ground applications of herbicides are feasible because the vegetation of this complex is not tall.

Glyphosate can provide good control of rhododendron and false azalea. However, *Vaccinium* species are more resistant to glyphosate and are often shielded from the spray by taller shrubs.

Timing of glyphosate treatment is important. For the shrub component, foliar applications in mid-summer are most effective. The herbaceous species are also sensitive to treatment timing. As senescence of herbaceous species generally occurs by mid-August, adequate control can be achieved when foliar applications of glyphosate are done no later than mid-August.

Late season application of glyphosate may control the shrub component, but may shift species composition to the rhizomatous herbs. The shrub community tends to return to its original stature and vigour within 3–4 years.

Despite the effectiveness of mid-summer applications of glyphosate, other efficacy and operational factors must be considered. First, mid-summer application of glyphosate may damage conifer advance regeneration when the buds are unhardened. As well, the insulating soil organic mat remains unaltered and temperature gains are smaller. Hence, seedling growth responses are generally less than with MSP. Finally, planter access is reduced as herbicide treatment leaves dead shrub material standing for several years. A treatment such as hand slashing may be required to improve access.

Foliar applications of hexazinone, 2,4-D ester and triclopyr ester remain largely untested in this complex in B.C. Broadcast application of 2,4-D ester in the summer results in minimum injury to the shrub component.

Seeding

Seeding of cover crops has generally not been used in the ericaceous shrub complex.

Livestock Grazing

White-flowered rhododendron is poisonous to sheep. Sheep will avoid this species where they have been properly conditioned and other forage is available. False azalea is unpalatable to sheep. Sheep browsing is therefore not an appropriate treatment where these two shrub species form a significant component of this complex. However, sheep have successfully controlled vegetation on ESSF sites dominated by herbs (e.g., fireweed, Sitka valerian) with minor components of ericaceous shrubs.

Planting

Timing

A one-season delay between site preparation and planting will reduce plantation success by allowing vegetation to re-occupy the site.

Stock Type

Hot-lifted PSB 313 summer stock appears well suited for use in the ESSF. These sites are not drought-prone. Using hot-lifted stock extends the planting season and the incidence of frost damage is also reduced. Using larger stock sizes, such as PSB 415s, 512s or 615s, may provide a gain in growth or relief from competition for a year or two.

Species Selection

In general, Englemann spruce, with a minor component of subalpine fir, is recommended for planting. However, on drier sites or areas subject to mid-summer frost, lodgepole pine is preferred. On wetter subzones, using pine may be inappropriate due to poor stem form and breakage from snowpress.

Brushing

General

Prompt site preparation followed immediately by planting is the most appropriate option for dealing with brush problems in this complex. Well-developed ericaceous communities are often not well stocked with crop-tree seedlings. In such cases the value of brushing may be marginal.

Manual

This treatment may be successful on the shrub component provided mosses and not rhizomatous herbs dominate the understory. However, when herbs dominate, manual brushing of hundreds of thousands of stems per hectare makes this treatment prohibitively expensive, and crop tree damage is often extensive.

Sitka valerian resprouts vigorously and can reach 1.5 times its original height within six weeks of cutting or top removal. Shade-grown plants resprout slowly.

Chemical

Although use of glyphosate for shrub control is feasible, it has a very short treatment window and should be timed to minimize crop damage. Also, this treatment may promote herbaceous competition. See comments under *Site Preparation*.

Livestock Grazing

Usually inappropriate; see the section *Site Preparation*.

6. Vegetation Management Strategies for Backlog Sites

General

If fill-planting is prescribed, a spot site preparation treatment is needed. This may be accomplished using ground herbicide applications, treatments or small MSP machinery to create planting trails in predetermined areas.

When a backlog ericaceous shrub complex is rehabilitated, subsequent vegetation growth will be more vigorous than if it had been treated immediately after harvest. However, this effect is much less pronounced than in backlog examples of other complexes. Accordingly, the site preparation techniques outlined in Section 5, *Vegetation Management Strategies for Current Sites,* can be applied to backlog sites.

Mechanical

Refer to Section 5, *Vegetation Management Strategies for Current Sites*, but expect more rapid regrowth.

Prescribed Fire

While prescribed fire has been successful on this complex, the lack of fuels to carry the burn may result in spotty burns.

Chemical

See Section 5, *Vegetation Management Strategies for Current Sites.*

"Brown-and-Burn"

Glyphosate application may be used with fire in the form of "brown-and-burn," though this treatment has not been widely applied in this complex. Typically 4–6 weeks are required after treatment to allow browning, hence the burn will likely have to occur the year following spraying. Although the desired high-impact burn is difficult to achieve, "brown-and-burn" will produce more effective coverage and vegetation control than burning alone.

7. Summary of Treatment Efficacy

The ericaceous shrub complex is less aggressive than most other shrub complexes. However, its relatively slow growth rate is matched by the conifer crop trees on site. Therefore, implementing treatments promptly is necessary.

Among the non-chemical treatments, MSP is the most effective in controlling vegetation in this complex. Planting trails established with small caterpillars mounted with brush blades effectively control the vegetation, but can cause site degradation including long-term nutritional deficiencies. Large scalped patches and mounds are less effective in controlling the shrub community, but have less potential for site degradation.

Prescribed fire is an alternative to MSP on steep slopes provided the site can be burned. This treatment controls the shrub component but provides less overall control than more aggressive MSP methods.

Among the chemical treatments, glyphosate is the only herbicide recommended in this complex. Mid-summer treatments at high glyphosate application rates are suggested for site preparation. The chemical will control the shrub component of this complex, but it can shift species composition to rhizomatous herbs. Greater herb control can be achieved when sites are chemically treated in mid-July to early August. Glyphosate control of herbs lasts for two to three years.

For More Information

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APPENDIX – KEY TO BIOGEOCLIMATIC ZONES OF BRITISH COLUMBIA

AT	Alpine Tundra	IDF	Interior Douglas-fir
BG	Bunchgrass	MH	Mountain Hemlock
BWBS	Boreal White and Black Spruce	MS	Montane Spruce
CDF	Coastal Douglas-fir	PP	Ponderosa Pine
CWH	Coastal Western Hemlock	SBPS	Sub-Boreal Pine–Spruce
ESSF	Engelmann Spruce–Subalpine Fir	SBS	Sub-Boreal Spruce
ICH	Interior Cedar–Hemlock	SWB	Spruce–Willow–Birch